PATENT SPECIFICATION

DRAWINGS ATTACHED

908,344

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International Classification:—**B65b.**

COMPLETE SPECIFICATION

Method and Apparatus for Manufacturing Capsules of Thermo-weldable Material

I, LIONEL LAVAUD, of French Nationality, of 5, Rue Lamartine, Rueil-Malmaison, (Seine-et-Oise), France, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method and an apparatus for manufacturing one or two compartment capsules of thermo-weldable material.

It has already been proposed to form capsules by first forming a tube from a folded strip or band of thermo-weldable material, or from two strips or bands of such material, then filling the tube with the product to be wrapped or packed and finally welding each end of each section of the tube which is to form a single capsule by pincers or the like which also squeeze the product contained in the tube away from the area or zone to be welded. Apparatus at present in use for manufacturing capsules as above described uses a tube of considerable length which is first completely filled with the product to be wrapped or packed, and this presents considerable difficulties.

The object of the present invention is to provide a method and apparatus for the manufacture of capsules in which the known difficulties are eliminated by providing means for filling the capsule during the formation of said capsule.

Moreover, with the method according to the present invention the product remains protected from the ambient atmosphere even during the filling.

The method according to the invention comprises in succession the step of feeding two or more strips of themo-weldable material between two mould members, the step of moving said mould members towards one another until said strips are pressed together along a pressure line which substantially corresponds to the outline of a single capsule, and which is continuous except for one or two inlet gaps left for filling the capsule, the step of applying said strips of thermo-weldable material against the interior walls of the mould members, the step of filling the space or spaces bounded by said strips and said pressure line with a product to be encapsulated through said inlet gap or gaps and the step of welding said strips together around said pressure line and over said inlet gap or gaps.

The apparatus for carrying out this method comprises means for feeding strips of thermo-weldable material, a mould comprising two mould members having internal walls conforming to the desired configuration of a capsule, means for moving said mould members rectilinearly towards one another in order to press strips of thermo-weldable material, which have been fed between them, together along a pressure line substantially corresponding to the outline of a single capsule, the mould members being so formed that there is one or two gaps in said pressure line, means for applying said strips of material against the internal walls of the mould, a nozzle of two nozzles arranged to feed a product to be encapsulated into the space or spaces bounded by said strips and said pressure line through said gap or gaps and means for welding said strips together around said pressure line and over said gap or gaps.

Other features and advantages of the invention will become apparent from the following description of one particular embodiment thereof given by way of example with refer-

[*Price* 4s. 6d.]

Price 25p

ence to the accompanying drawings in which:—

Figure 1 illustrates an apparatus capable of carrying out the method, diagrammatically in cross-section, the parts being shown in the position corresponding to a first phase of the method,

Figure 2 is a similar view of the same apparatus showing the parts in the position of a second phase of the method,

Figure 3 is a plan view of the mould members,

Figure 4 is a section of a finished capsule.

Figures 5 and 6 illustrate a method of forming hemispherical capsules and,

Figure 7 is a section of a capsule having two compartments.

Referring to these drawings, the machine according to the invention comprises a frame 1 forming a casing, spools 2 from which are fed strips 3 of thermo-weldable material, roller means 4 for feeding said bands to the point of formation of the capsules, two mould-members 5 and 6 each comprising a conduit 5a, 6a communicating with an evacuating device, two electrodes 7 and 8 connected to a source of high frequency electric current or other heating means, a nozzle 9 for filling the product into the capsules to be formed and if desired a pre-heating device such as resistors 10, a cutting device 11 and a discharge chute 12.

The assembly of moulds and electrodes is subject to two movements, one of which is horizontal, the other vertical.

For this purpose the moulds 5 and 6 slide in the hollow electrodes 7 and 8, respectively, which are each integral with a piston 13 of a horizontal ram 14 mounted on a carriage 15 which is vertically reciprocable by a vertical ram 16, the cylinder of which is attached to the frame 1.

Abutments 17 fixed to the frame co-operate with fingers 18 integral each with one of the electrodes in order to limit the movement of the electrodes during the first phase of the capsule-forming cycle, as is described below.

As will be seen from Figure 3, the moulds have a small gap 20 formed between their edges, forming a passage for the nozzle 9 for the distribution of the product to be encapsulated during the filling.

In the machine described and illustrated this nozzle 9 is fixed and the assemblies of moulds and electrodes are movable. However, it will be understood that the moulds and electrodes could be arranged so as to be only horizontally movable and the nozzle 9 be made vertically reciprocable.

When the method according to the invention is to be carried out, the two strips 3 of thermo-weldable material are passed between the two movable mould members 5 and 6 for stamping, the nozzle 9 being placed between these strips and projecting into the interior of these mould members when the same are caused to approach one another by the action of the ram 14 (Figure 1). A reduced pressure is generated by suction through the ducts 5*a* and 6*a*, so that each strip will be drawn against the inner wall face of the associated mould member.

When the material is sufficiently pliable or is made pliable by pre-heating, for example by means of the device 10, these strips by hugging the form of the moulds, form two hemispherical shells into the interior of which the product to be encapsulated is fed by the nozzle 9. It will be noted that the capsule can be completely filled while protected from the ambient atmosphere, which is particularly desirable for the encapculation of easily oxidizable substances, or of those which have to remain aseptic.

Since the expanding of the rams 14 is initiated while the carriages 15 are at the top of their stroke, the fixed abutments 17 meet the fingers 18 of the electrodes as the electrodes descend, and restrain the latter from coming into contact with the strips 3; a spring 21 pushes each mould member 5, 6 in advance of the electrodes 7, 8 so that the edges of the mould members are applied firmly against the said strips, along a line surrounding the capsule except at the inlet gap 20.

When the carriage 15 descends under the action of the ram 16, while the rams 14 remain under pressure, the fingers 18 escape from the abutments 17, and the electrodes 7 and 8 approach one another and effect the welding necessary for sealing the product in the capsule, i.e. around the edges and over the gap 20.

The capsules may be discharged as a string, or may be severed by a cutting device 11 and received one by one in a delivery chute 12.

The cutting device may be combined with the electrodes for effecting the welding and cutting simultaneously, for example the ends of the electrodes 7 and 8 may be knife edged.

The mould members may be of any suitable shape, in order to produce a desired shape of capsule.

In Figure 4 is shown a capsule 22 with a neck 22*a* for facilitating pouring.

If it is desired to form capsules which are flat at one of their sides it is possible to replace one of the described electrodes and mould member assemblies by a slab 23 (Figure 5) serving both as a mould member and as an electrode. The production of such capsules can be carried out in duplicate if a slab 23 (Figure 6) is placed between the assemblies already described hereinabove, and two sets of strips 3*a* and 3*b* are used.

When the moulds are provided with an

engraving constituting for example a mark, the latter will be imprinted in the shaping of the package.

Finally, if a third strip 3*c* (Figure 7) is fed into the apparatus between strips 3, and two nozzles 9 are provided, one on either side of the central strip 3*c*, the apparatus as described will produce a capsule with two compartments A and B separated by a partition formed from strip 3*c* welded to the other strips.

It is self-evident that without departing from the scope of the present invention any modification of the embodiments described hereinabove may be carried out in particular to multiply the number of nozzles 9 and of capsule-forming recesses in the mould members in order to increase the production. This would be particularly convenient in the production of suppositories.

WHAT I CLAIM IS:—

1. A method for the manufacture of one- or two-compartment capsules, comprising in succession the step of feeding two or more strips of thermo-weldable material between two mould members, the step of moving said mould members towards one another until said strips are pressed together along a pressure line which substantially corresponds to the outline of a single capsule, and which is continuous except for one or two gaps left for filling the capsule, the step of applying said strips of thermo-weldable material against the interior walls of the mould members, the step of filling the space or spaces bounded by said strips and said pressure line with a product to be encapsulated through said inlet gap, or gaps, and the step of welding said strips together around said pressure line and over said inlet gap or gaps.

2. A method according to Claim 1, wherein a reduced pressure is generated within the mould in order to cause said strips to be pressed against the interior walls of the mould.

3. A method according to Claim 1 or 2, wherein said thermo-weldable material is preheated before being passed between said mould members.

4. A method according to any of Claims 1 to 3, wherein said strips are welded together outside said pressure line.

5. Apparatus for the manufacture of one- or two-compartment capsules by the method of any of Claims 1 to 4, comprising means for feeding strips of thermo-weldable material a mould comprising two mould members having internal walls conforming to the desired configuration of a capsule, means for moving said mould members rectilinearly towards one another in order to press strips of thermo-weldable material, which have been fed between them, together along a pressure line substantially corresponding to the outline of a single capsule, the mould members being so formed that there is one or two gaps in said pressure line, means for applying said strips of material against the internal walls of the mould, a nozzle or two nozzles arranged to feed a product to be encapsulated into the space or spaces bounded by said strips and said pressure line through said gap or gaps, and means for welding said strips together around said pressure line and over said gap or gaps.

6. Apparatus according to Claim 5, wherein means are provided for reciprocating said mould members relative to one another together with the means for welding the strips together, in said direction of rectilinear movement of the mould members.

7. Apparatus according to Claims 5 or 6, wherein said nozzle and said mould members are relatively reciprocable in a transverse direction to the direction of rectilinear movement of the mould members.

8. Apparatus according to Claim 6 or 7, wherein the means for welding the strips together surround the mould members.

9. Apparatus according to any of Claims 6 to 8, wherein the means for welding the strips together comprise hollow electrodes, the mould members being slidably mounted within said electrodes.

10. A method for the manufacture of capsules, substantially as herein described with reference to the accompanying drawings.

11. Apparatus for the manufacture of capsules, substantially as herein described with reference to the accompanying drawings.

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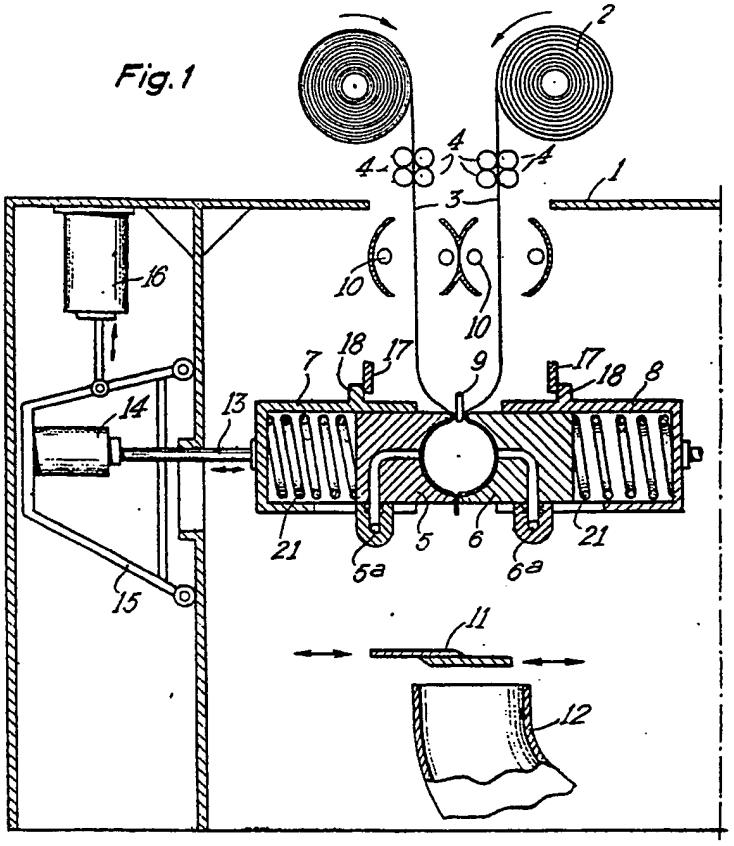
Fig. 1



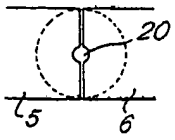


Fig. 3

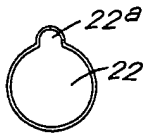


Fig. 4

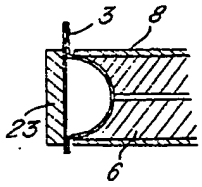


Fig. 5

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Sheets 1 & 2

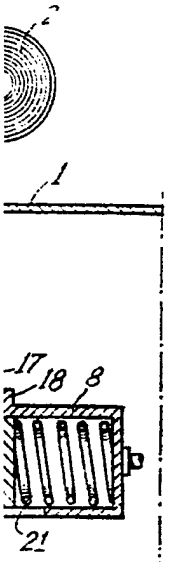
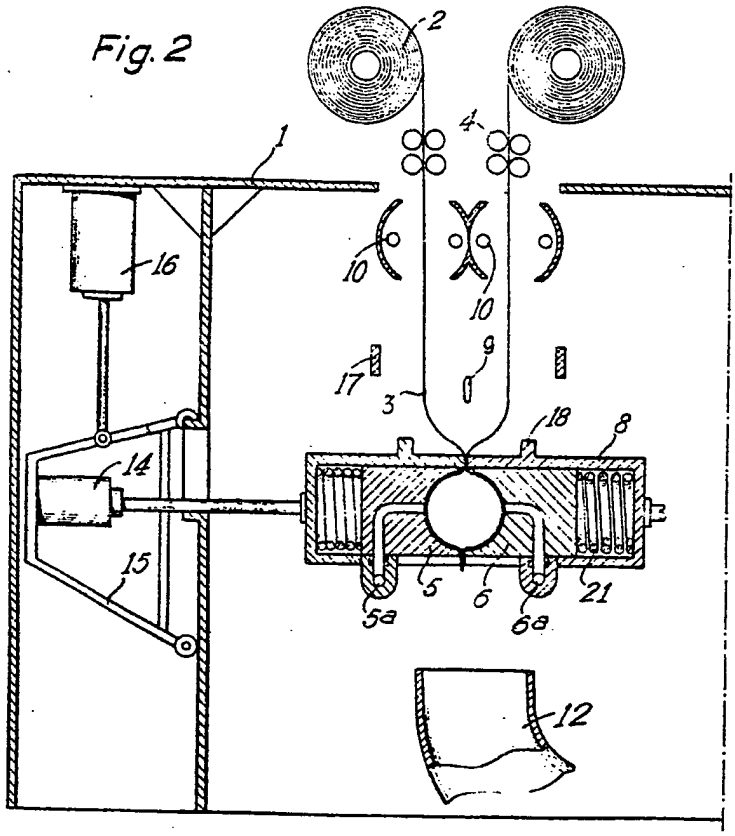


Fig. 2



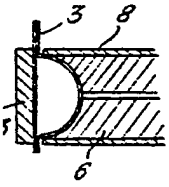


Fig. 5

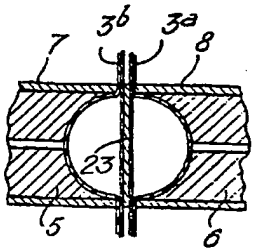


Fig. 6

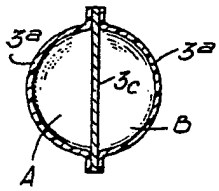


Fig. 7.

908344 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 1 & 2

Fig. 1

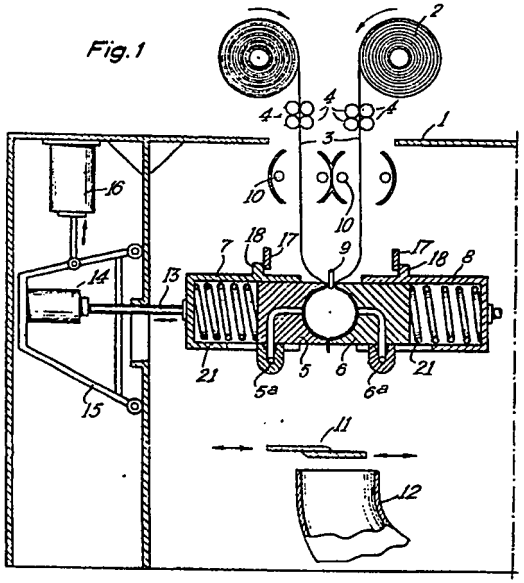
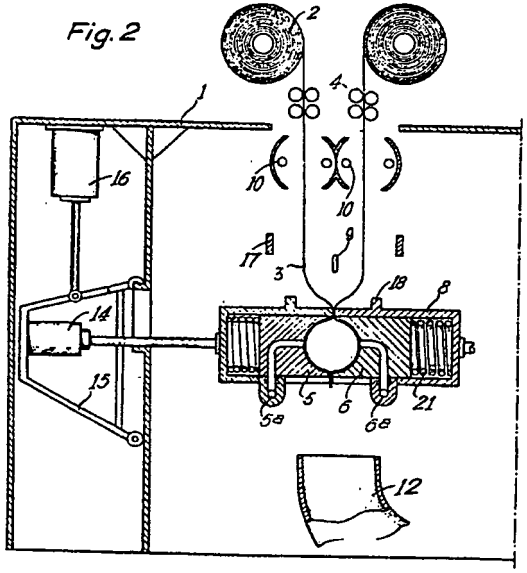


Fig. 2



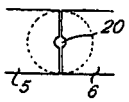


Fig. 3

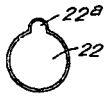


Fig. 4

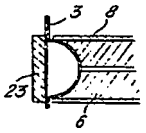


Fig. 5

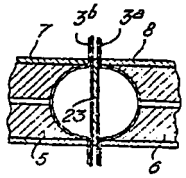


Fig. 6

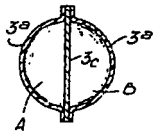


Fig. 7